

THE ORCHESTRA

By W. J. HENDERSON

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Orchestral Music," "The Story of Music," etc., etc.*



MENTOR GRAVURES

HECTOR BERLIOZ · HANS RICHTER · THEODORE
THOMAS · ANTON SEIDL · ARTHUR NIKISCH
ARTURO TOSCANINI



THEODORE THOMAS

 CONSIDERING the orchestra as merely a collection of instruments playing together, we might properly declare that it was as old as instrumental music. When Babylon was in the fullness of her splendor, her ruler spoke thus: "To you it is commanded, O people, nations and languages, that at what time ye hear the sound of the cornet, flute, harp, sackbut, psaltery, dulcimer and all kinds of music, ye fall down and worship the golden image that Nebuchadnezzar the king hath set up."

Nebuchadnezzar reigned in the sixth century B. C., and there is evidence that, 500 years before his time, Assyria came quite as near as he to having an orchestra. But none of these ancient nations, nor yet those of the Middle Ages, had any conception of balance or contrast in the disposition of an ensemble* of instruments. The medieval bands were based on a desire for rich, full sound. As Lavoix (la'-vwah) has said in his "History of Instrumentation," it was "mass, number, which the public sought, without troubling itself about the artistic effect."

Because music was studied only by the fathers of the Roman Catholic Church during the twelve centuries after the birth of Christ, only vocal church composition was developed. The orchestra was still an unbalanced

*Pronounced ong-sahm'-ble, and meaning here an "assembly" of instruments



THE WOOD-WIND CHOIR—BOSTON SYMPHONY ORCHESTRA

From left to right—Flutes, Bassoons, Oboes, English Horn (resting on the floor and curving upward), and Clarinets

mass of ill-assorted instruments when the Italian opera was born, at the end of the sixteenth century. Peri's "Euridice" (per'-ree's eu-re-dee'-chee) (1600) was accompanied by a harpsichord, two instruments (large and small) of the lute family, a lyre and three flutes. Claudio Monteverde's "Orfeo" (1607) used many more instruments, and the same master a little later composed for one scene in his "Il Combattimento di Tancredi (tan-cray'-dee) e Florinda," a descriptive accompaniment for three violas and a bass.

This was probably the first advance toward the string quartet, the foundation of the modern orchestra. In 1655 Cavalli (ka-val'-lee) put forth in his opera "Giasone" (jah-so'-neh), an accompaniment for two violins and bass, in a style which prevailed for fifty years. Alessandro Scarlatti (born 1659—died 1725) began the writing of accompaniments for two violins, viola and bass in four-part harmony, just as composers have done ever since. Flutes, oboes, bassoons, trumpets and tympani furnished the remainder of the early orchestra.

Foundation Principles

But the fundamental laws had been discovered. Composers had learned that they must write with their minds fixed on the comparative powers and characteristic tone qualities of the various instruments, in order to gain artistic and beautiful results. They had learned that the "strings" (the violin group) must be the foundation of the whole. They had gained an insight into the methods of obtaining solidity and transparency of tone. Since the basis of the orchestra was determined there has been no essential change in its constitution. A larger number

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THE BRASS CHOIR—BOSTON SYMPHONY ORCHESTRA

From left to right—Bass Tuba, Horns, Trumpets, Trombones

and variety of instruments is now employed than in the day of Haydn (heidn), but they are instruments of the same families as he used, and their relationship in the orchestra is unchanged.

Trombones do not appear in the scores of Haydn's symphonies, but he employed them in his oratorios. His symphonic orchestra contained flutes, oboes, clarinets (in his later works), bassoons, horns, trumpets, tympani (kettle drums), violins, violas, violoncellos and double basses (bass viols). Adding trombones, we have all that Beethoven had. Wagner and Richard Strauss use more kinds of flutes, oboes, clarinets and bassoons, a larger number of horns, trumpets and trombones, more kinds of instruments of percussion; but the ground plan of their orchestra and their broad treatment of its different parts is the same as Beethoven's.

The Modern Orchestra

The modern orchestra naturally divides itself into three principal groups of instruments and one accessory group. The three principal groups are instruments of wood, sounded by blowing through them (called the "wood-wind," and including flutes, oboes, clarinets and bassoons), instruments of brass, operated in the same way (including the various horns, trumpets and trombones), and stringed instruments, played with bows. The accessory group is composed of instruments of percussion (the drums, triangle, cymbals, etc.). To the musical profession, and therefore to the instructed amateur, the groups are known as the "wood," the "brass," the "strings," and the "battery."

When a composer writes down a piece for orchestra he sets the instruments in the following order from the top of the page of his music "score," as it is called: flutes, oboes, clarinets, bassoons, horns, trumpets, trombones, tubas, tympani (kettle drums), and other instruments of

THE STRING
CHOIR—BOSTON
SYMPHONY
ORCHESTRA



From left to right
—Bass Viol (in the
back), Violoncello
(in front, called
"Cello"), First Vi-
olin, Second Violin,
Viola, Harp



percussion; harps, violins, violas, violoncellos (usually abbreviated to 'cellos), double basses (bass viols). If there are vocal parts in the composition, as in opera or oratorio, they will be found in the older scores between the violas and the 'cellos. The present custom is to place them above the violins.

The "Wood-Wind" Instruments

Two flutes, two oboes, two clarinets and two bassoons formed the "wood-wind" group of the earlier writers, and we may first examine these instruments individually. As a mouthpiece the flute has a mere hole in its side. The player applies his lips in a certain position, blows, and by the vibration of the lips sets the sound waves in motion in the bore of the instrument. Almost every one must be acquainted with the sound of the flute. It remains only to add that it has a high compass, and that it is capable of executing very rapid and complicated passages. Also, its low register has a special individuality of tone, which composers use to great advantage in producing characteristic effects. The piccolo or octave flute is a smaller flute, with a higher compass and shriller tone, and is much used in such effects as storms, Wagnerian "fire" music, or grotesque dances, such as those of Delibes' (del-leeb's) dolls.* Many later compositions call for three flutes and a piccolo.



FLUTE

Daniel Maquarre, Philadelphia Orchestra

*This refers to the scene in the Doll Shop in Delibes' pantomime ballet, "Coppelia."

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Oboes and the other instruments of their family have a mouthpiece at one end. This mouthpiece contains two vibrating reeds, set in motion by the player's breath. These form the sound producing medium. The scale is played by the operation of keys that open and close holes at various points along the tube of the instrument, as in the case of the flutes also. The tone is not powerful, but is penetrating. It is unique in character, suggesting the "oaten reed" of the ancient pastoral god Pan, so that it has been from early time the musical symbol of the shepherd's pipe and pastoral scenes, and for tender or reflective utterances. It is a soprano instrument, with a scale ranging from C below the treble clef upward through two octaves and a half. Oboes* are used in pairs, the second one filling in one of the middle voices of the general harmony.



OBOE

Henri de Busscher, New York
Symphony Orchestra

The English horn is the alto of the oboe, and has the same reed-like character. It is somewhat larger, but otherwise not greatly dissimilar. The bassoon, which is a large instrument, is the bass of the oboe family. It cannot be blown at one end like the others, because it is too long. It has a pipe leading into its side and the mouthpiece is at the end of this pipe. Its tone in the upper register is similar to that of the English horn, while in the lower part it becomes rough and heavy. The instrument has a scale ranging from low bass up into the lower treble, and its variety of expression is quite remarkable. It is used for pastoral or even melancholy expression, Tchaikovsky (chai-kov'-skee) in particular finding it admirable in the latter capacity. It is also available for humorous passages of a rustic type, as in the clowns' march in

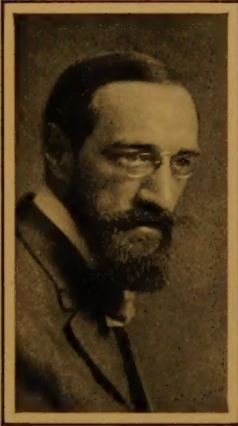


NEW YORK PHILHARMONIC ORCHESTRA—Josef Stransky, Conductor

The oldest permanent orchestra in America, and the third oldest in the world—founded in 1842

*The other instruments of the orchestra tune up to the oboe. This is a tradition from the time of Handel, when the oboe was the principal wind instrument.

Mendelssohn's "Midsummer Night's Dream" music. The effect results from the incongruity of the hoarse, heavy tone and the type of melody allotted to the bassoon. There is also a contra-bassoon, a bass instrument of still lower pitch. Clarinets are instruments of larger bore than oboes, and, having mouthpieces with but a single reed, their tone is fuller, richer, and less reedy. They have a large compass, ranging from the alto region to high treble, and are capable of executing rapid and complicated passages with effect. The tone can be graded in force from the faintest pianissimo (soft) to a sonorous forte (loud), and the clarinet thus becomes the most expressive instrument among the wood-wind. It is, indeed, as Berlioz declared, the true dramatic soprano of the wind band. It is always found in pairs in the older scores, but recent writers often call for three and sometimes for four. There is also a bass clarinet, which carries the tone of this family far down into the lower scale. The bass clarinet is admirable as a solo instrument, and naturally can also be employed as a bass in chords. A contra-bass clarinet carries the range of the family still further downward, and provides a tone like that of a large organ pipe.



GEORGE BARRERE
Distinguished Flute Soloist,
New York Symphony Or-
chestra



FIRST CLARINET
Gustav Langenus, New York Symphony
Orchestra

The Brass Instruments

The instruments of the brass choir have no reeds in the mouthpieces. The vibrations are furnished by the lips of the players. Every brass instrument can be made to produce a certain series of tones merely by blowing, and without the operation of valves.

These are known as the natural tones, and in early times were alone available to composers. But now horns and trumpets are furnished with valves, three in number. The pressing down of a valve opens a section of tubing which alters the total length of the tube of the instrument and thus changes its key, thereby giving the player another series of natural tones. The valve trumpets and horns have a complete chromatic scale.* In the trombone this same result is obtained by moving the slide, as you can see the players doing at any concert. This alters the length of the tube and changes the key of the trombone.

The variety in the quality of tone among the brass choir is due to the differences in the lengths and borings of the tubes, and of the shape of the mouthpieces. The horn has a deep

* A chromatic scale runs through all the tones—semi-tones as well as full tones—of the octave.

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conical mouthpiece; trumpets and trombones have mouthpieces shaped much like the lower half of an egg cup. The reader need not be perplexed with details as to the tubes. It is enough to know the general principle: large tube, low pitch; small tube, high pitch. Trombones, for example, are made in various



FIRST VIOLIN
Thaddeus Rich, Concert Master Philadelphia Orchestra



FIRST VIOLIN
Maximilian Pilzer, New York Philharmonic Orchestra

registers, from soprano to bass, the first named being comparatively small, the last quite large. In modern scores the lowest bass of the brass is furnished by the tuba, a huge, deep-toned instrument of the Saxhorn family.

The horn is the mellowest and richest of the brass instruments, and blends with wood or strings as well as with trumpets and trombones. Hence it is a useful solo singer, and an essential of the harmony. The trumpet is the military member of the brass choir, because its tone is not strikingly different from that of a bugle. The trombone is the noblest chanter of the choir, as it proves in the overture to "Tannhäuser." Four horns are now found in orchestras, thus giving a full harmony independently. Trumpets appear sometimes in pairs, sometimes in triplets, and again in fours. Trombones are usually employed three at a time. All of these instruments can be treated as solo voices, or as parts of the general harmony.

Producing Orchestral Effects

It will be seen that the wood-wind instruments offer numerous combinations for chords. Two flutes and two clarinets, two clarinets and two oboes, two oboes and two bassoons—any of these squads can be used independently. By changing the combination the composer alters the tonal character of his chord. By joining instruments of different families he obtains still other tone colors.* Thus is variety secured. Firmness of texture results from dividing the notes of every chord properly among the instruments, so that there is no lack of balance. In the singing of the melody, too, by using first one kind of instrument and then another, and again by making two sound the same notes together, the composer can impart almost inexhaustible variety to his idea.

The same conditions attach to the choir of string instruments, with the addition that, within themselves, the bowed instruments are capable

* See paragraph on page 12 for explanation of tone color.

of a larger range of effects than either the wood or the brass. The strings are the foundation of the orchestra, and skill in writing for them is the basis of good orchestration. The violin is the chief singer of the orchestra. Its compass stretches from G below the treble clef, three and a half octaves upward. So it is a contralto, a dramatic, a lyric and a coloratura soprano, for there is almost no limit to its expression and agility. Furthermore, its compass can be even further extended upward by the use of harmonics; that is, little, thin, flute-like tones produced by a particular kind of finger pressure. These harmonics can be obtained from each of the four strings. Each string also yields an extended scale in itself by the employment of different positions of the left hand on the finger board. Since each string has a special tonal character, a violin becomes in effect a singer with four voices, yet blending so perfectly in the sweep of the full scale that they become one.

One violin playing alone gives a different effect from a dozen playing together, and these again from two or three heard simultaneously. The manner of using the bow brings forth still other effects. Playing close to the bridge makes rude sounds; over the finger-board, veiled tones. Bouncing the bow in short, sharp strokes or smoothly drawing in long ones creates sounds wholly unlike. Again, plucking the strings with the fingers (pizzicato) offers new opportunities to the composer. And when the sordine, a little thing looking like a comb, is pressed down over the strings at the bridge, the violin whispers like an æolian harp.



THE VIOLONCELLO

Called the 'Cello ("chello"). Three solo players. Directly above, Cornelius Van Vliet, Minneapolis Symphony Orchestra



LEO SCHULZ

New York Philharmonic Orchestra



HANS KINDLER

Philadelphia Orchestra

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The viola is a lower toned violin, whose compass begins with the C below the G of the violin. Its tone is, therefore, characteristic, and it can be used for solo effects as well as to unite with the general harmony. All that can be done on a violin can be done on a viola. The violoncello is a still larger instrument of the viol family, with a compass ranging from the low C of the bass clef to high up in the treble. It is a valuable solo instrument because of its characteristic tone, and it can be used in many ways in the formation of chords. Harmonics, pizzicati, etc., are available here as in the violin and viola. The double bass is the deepest toned instrument of the viol family, its scale beginning with the E an octave below the bass clef. All that has been said about the other strings applies also to it.

In full harmonies of simple type the first violin supplies the soprano, the second the contralto, the viola the tenor, the 'cello the baritone, and the double bass the bass. But often the com-



BASS VIOL
Called the "Double Bass." Anton Torello
Philadelphia Orchestra



THE HARP
Henry T. Williams, Minneapolis Symphony Orchestra

poser has more than five notes in his chord, and he divides his violins into more than two parts. The violas, 'cellos and double basses can be divided. So, too, any member of the choir can be omitted and the harmony given to one or more of the others. Violins can play in four or more parts; so can violas, 'cellos or double basses. Again, the melody can be given to the viola or the 'cello and the accompaniment to the others. Thus we see that almost numberless combinations can be made to give variety. So when we remember that any or all of the strings can be combined with any or all of the other instruments, we see that the resources of the composer are large.

The tympani (kettle drums) are the principal members of the percussion department. They can be tuned to different notes and thus made to assist in the harmony. They are even given solo effects at times, as in Beethoven's fourth, fifth and ninth symphonies.

Other instruments of the percussion department which have melodic properties are bells and the xylophone (zeil'-o-phone), while those that can only beat rhythms are the snare and bass drums, triangle, castanets, etc.

Composers must orchestrate so melody and harmonies shall be heard in their correct relations. This is called balance of parts. When it is attained, the music sounds clear, richly sonorous, instead of thick and noisy.

The Conductor's Art

He does his work at rehearsal, not, as many suppose, at the public performance. While actually directing at the concert, he reminds his men by his gestures of

what he told them repeatedly at rehearsal. Players who have to come in after several measures' rest he aids by giving the cue for entrance. If the time becomes too fast or too slow, he brings it back to the correct rate. If the loudness or softness is not just what he wishes, he modifies it. But the general plan of the performance and all the intricate details of light and shade must be carefully prepared beforehand. It is in the excellence of the body itself, and the patient polishing of its playing, that the great orchestra rises superior to the ordinary one. Conducting is at least as old as the beginning of the fourteenth century, but the modern period, in which it rose above mere time beating to a supreme interpretive art, begins with the work of Johann Stamitz (1717-57), director of the Mannheim (Germany) Orchestra, and François (frahn-swah') Joseph Gossec (1734-1829), founder of the Concerts des Amateurs (days-âma-tuhr') in Paris. These two made a close study of the technic of orchestral playing,



FRANÇOIS-ANTOINE
HABENECK
Founder of the famous old Conservatoire Orchestra, Paris



LEOPOLD DAMROSCH
Former Conductor of the New York Philharmonic. Founder of the New York Symphony Society and the Oratorio Society
Father of Walter Damrosch



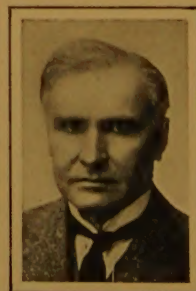
LEOPOLD STOKOWSKI
Conductor Philadelphia Orchestra



EMIL OBERHOFFER
Conductor Minneapolis Orchestra



FRED. STOCK
Conductor Chicago Orchestra



WALTER DAMROSCH
Conductor New York Symphony Orchestra



KARL MUCK
Conductor Boston Symphony Orchestra

THE ORCHESTRA



CHARLES LAMOUREUX

A noted Conductor of the Paris Conservatoire and other musical organizations

and brought it to a point of refinement at which real interpretation became possible. Since their time the orchestra has been developed under many master hands until to-day, when we find it the fullest and most eloquent instrument of musical expression.

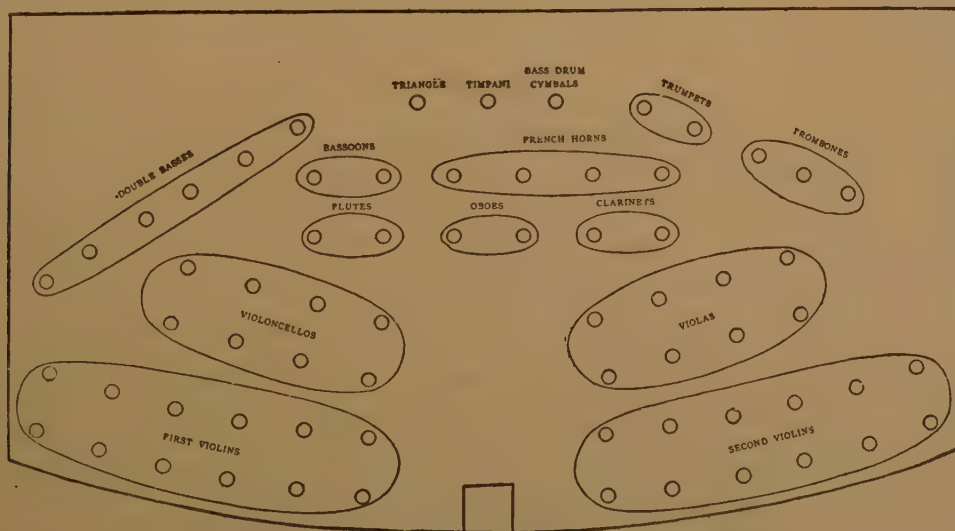


JOSEF STRANSKY
Conductor New York
Philharmonic Orchestra



ALFRED HERTZ
Conductor
San Francisco Orchestra

It remains only to say that the United States not only rivals, but surpasses, Europe in the number of its great concert orchestras. The Boston Symphony Orchestra, founded by Henry L. Higginson, and now conducted by Dr. Karl Muck, is a distinguished body of performers. Then there is the Chicago Orchestra, conducted by Frederick Stock, and the San Francisco Orchestra, at present under the leadership of Alfred Hertz. The Philadelphia Orchestra, directed by Leopold Stokowski (sto-kov'-skee), has assumed high rank, and the Minneapolis Orchestra, Emil Oberhoffer, conductor, invites consideration. The oldest orchestra in the United States is the Philharmonic of New York, founded in 1842.



PLAN SHOWING USUAL ARRANGEMENT OF AN ORCHESTRA

SUPPLEMENTARY READING

THE ORCHESTRA AND ORCHESTRAL
MUSIC. Illustrated. By W. J. Henderson

ORCHESTRAL INSTRUMENTS AND THEIR
USE. Illustrated. By Arthur Elson

**Information concerning the above books may be had on application to the Editor of The Mentor.

THE OPEN LETTER

Editor of The Mentor,

DEAR SIR: The Mentor on Russian Music is intensely interesting. I want to learn more about Scriabin. The Mentor says that one of his conceits was to combine "perfume and colored lights" with orchestral sounds. Please enlighten me. I once heard a music teacher ask her class to define "color" in music. No one succeeded, and I have often wondered what it was. I will appreciate an explanation.

This question has to do with two entirely different things. "Color" in music is one thing—Scriabin's experiment another. The term "color" has been used in musical art for many years, and it has a definite meaning to educated musicians. It is not easy to impart that meaning to the general reader. The arts do not possess complete separate vocabularies. The same words have to serve several arts. In order, therefore, to get a clear understanding of some of the qualities of one art we have to borrow words from another art. And so we speak of "tones" in painting, and "color" in music.

★ ★ ★

When you hear a note in music, you think you hear only one tone. As a matter of fact, the note is made up of the fundamental tone and a number of little overtones that sound with it. For example, when you hear the note of C natural on some instruments, the note of G a fifth above will be sounding in with it, also perhaps the note of E above that, and other higher notes. You may not be able to detect them, but these overtones are there. Every voice and every musical instrument has what is called its "tone color," due to these faint overtones that accompany the fundamental tones of the voice or instrument. Thanks to these little overtones you can tell whether a musical note is being played on a violin, a trumpet or a clarinet. These humming overtones differ in number, pitch and loudness in different instruments. In orchestral works, the "color" varies endlessly because of the infinite number of combinations afforded by the different instruments—of wood, brass or silver—each with its own little overtones. To mix

these various tones is like mixing paints of different color—hence the musicians adopted the word "color."

Scriabin's use of color is quite a different thing. He combined *actual* color and perfumes with music, with the purpose of making an appeal simultaneously to three different senses—sight, hearing, and smell. He used a scheme of real colors visible to the eye, which were thrown on a screen and were controlled by means of a keyboard. He associated certain colors with certain harmonies, and he blended perfumes with the music and colors. This three-fold art of Scriabin's found expression in several works, one of which he called a "Mystery," and which had performances in various cities of Europe. The whole idea was quite too queer. The result was vague, and the idea too fantastic to make a convincing art appeal

★ ★ ★

While on the subject of Russian composers, it might be well to say a word concerning the pronunciation of Russian names. I think that some of us are unduly alarmed by the "itches" and "iskees" that end many Russian names. Petro'vitch should not disturb anyone. It is pronounced exactly as spelt. Glinka is another case, altogether simple; likewise Rubinstein and Borodin (it is simply bor'-o-din). There are some, however, that are not so simple. Here are the pronunciations of them, indicated as well as possible by phonetic spelling:

Peter Ilich Tchaikovsky (peter il'-yitch chai-kov'-skee); Nicholas Andreievich Rimsky-Korsakov (nik'-o-las an-drey'-ay-vitch rim'-skee kor'-sa-kov); Igor Stravinsky (strah-vin'-skee); Michael Ivanovitch Glinka (mik-hail' ee-vahn'-o-vitch glin'-ka); Modeste Petrovitch Moussorgsky (moe-dest' pet-ro'-vitch moo-sorg'-skee); Mili Balakirev (mee'-lee bah-lah-kee'-rev); Liadov (lyah'-dov); Rachmaninov (rak-man'-ee-nov); Scriabin (skree'-a-bin); Ippolitov-Ivanov (ip-pol'-ee-tov eev'-an-ov); Diaghileff (dee-ag'-ee-left); Massine (mass-ee-n'.) Pavlowa (pav-lo'-vah). Nijinsky (nee-zhin'-skee.)

W.D. Moffat
EDITOR





FOR many years Brazil was a possession of Portugal; and, for that reason, the people of Brazil are for the most part of Portuguese descent, and the language of the country is Portuguese.

Pinzon, a companion of Columbus, really discovered Brazil in February, 1499; but it was in the following year that

the Portuguese commander Pedro (English pronunciation, pee'-dro; Spanish, pay'-dro) Alvares Cabral, sailing toward India, reached the coast of Brazil on April 24, and anchored off the coast of what is now the State of Bahia. On Easter Day an altar was erected on the shore, and the country was declared a possession of Portugal.

The news reached Portugal in the fall, and King Manuel at once sent out expeditions to explore the land. The only article of value that they found was a red dye-wood, similar to the brazilwood previously imported from the East Indies. Thus the land became known as *terra de brasil*, "the brazilwood country," ultimately shortened to Brazil.

The first real settlement in Brazil by the Portuguese was made in January, 1532, at São Vicente (sahng vee-sen-tay), near the port of Santos. King John III of Portugal divided the whole Brazilian coast into twelve parallel strips of land, each extending 150 miles along the coast. These were called captaincies, and were granted to favorites of the King. This system did not prove a success. For this reason the Portuguese Government, in 1549, sent over Thomé (toe-may) de Souza as Governor-General to centralize the colony. He established the Portuguese power on a firm basis.

Brazil prospered, and was in consequence a source of jealousy to other nations. For many years the Portuguese authorities had a great deal of trouble with both French and Dutch settlers. In the end, after many struggles, these were expelled.

Then, with the increase of population and prosperity, the colonists of Brazil began to show discontent with the Portuguese Government. Plots and conspiracies against the government were hatched. These were quickly suppressed, however, and when, a few years later, in 1808, Dom John, Prince Regent of Portugal, fleeing from Napoleon, whose armies were descending upon Portugal, landed in Rio de Janeiro, he was received with enthusiasm. He remained in Brazil for some years; but his sojourn there only postponed the inevitable day when Brazil should seek independence. Dom John returned to Portugal in 1821, leaving his son Pedro in charge; and at his departure

he told Pedro to put the crown upon his own head, if it seemed that the people of Brazil were likely to assert their independence. This is exactly what happened; and on October 12, 1822, Pedro was crowned Constitutional Emperor of Brazil. Unfortunately for himself, Dom Pedro tried to be a despot. The Brazilians were fiercely opposed to despotism. So when the public debt increased because of an expensive war with Argentina and for other causes, Dom Pedro's last hold upon the people disappeared.

In 1831, a great number of the best people of Rio assembled and marched to the residence of the Emperor. No violence was offered, but the crowd refused to disperse. At last, very early in the morning of April 8, 1831, Pedro resigned, writing out an abdication in favor of his son, a boy of only five years: "I have voluntarily abdicated in favor of my dearly beloved and esteemed son, Dom Pedro de Alcantara. I shall retire to Europe and leave a country I have always loved and still love." He left immediately for Europe, where he died three years later.

The country was still in an unsettled condition, however, and stormy times continued. Finally, Dom Pedro II, when only fifteen years old, was proclaimed of age and took the throne. At last, after some years, the country was pacified and prosperity followed. Commerce increased, general industry developed, and political reforms were instituted.

Pedro II ruled for many years. But as time passed there was a gradual trend toward a republican form of government. At last, on November 15, 1889, the Emperor and his family were placed on board ship and sent off to Portugal. Pedro died at Paris on December 5, 1891. A provisional government for Brazil was formed. In 1890-91 a congress was assembled and a constitution adopted. General Deodoro da Fonseca was elected president.

Financial troubles soon sprang up, and the president was forced to resign in favor of Vice-President Peixoto (pay-shoh'-to). Other insurrections followed, and then financial distress, which reached its height in 1900. Since that time, however, the country has advanced rapidly in wealth and population and along all other lines of development.





IN 1890 a congress met and drafted for Brazil a federal constitution modeled on that of the United States. This was adopted on February 4, 1891. Since that time Brazil has had its share of insurrection and civil war, but by that constitution the republic is still governed.

The supreme powers of the nation are vested in three branches of government—executive, legislative and judicial. The federation consists of twenty States, one territory and one federal district.

The executive power of the nation rests with the president. He is elected for a term of four years by a direct vote of the electors, and must be a native Brazilian over thirty-five years old. He is ineligible for re-election for the next succeeding term. As in the United States, a vice-president is elected, who is president of the senate and succeeds to the presidency in case the office becomes vacant during the last two years of the presidential term. If the vacancy occurs during the first two years, a new election must be held. The president has a cabinet of seven ministers—Justice and Interior, Foreign Relations, Marine, War, Communications and Public Works, Finance, and Agriculture, Industry and Commerce. These are appointed, and may be removed by him.

The legislative power of Brazil rests with a national congress of two houses. The senate consists of sixty-three members, three from each State and the federal district, who are elected for a period of nine years. The senators must be not less than thirty-five years of age. The membership of the chamber of deputies is distributed among the States on a basis of one for each 70,000 population, but with a minimum representation of four for each State. These deputies are elected for three years.

The judiciary consists of a supreme court of fifteen judges in the national capital and a district tribunal in the capital of each State. The judges are appointed for life by the president, with the approval of the senate.

The peace strength of the Brazilian army is about 32,000 officers and men. The war strength probably exceeds 300,000 men. The police force is also organized on a military footing, and is credited with 20,000 men. According to law, military service is obligatory, but the government has been unable to enforce this. The president is nominally commander-in-chief of the army, but the actual command

is vested in a general staff in the national capital, and in the general commanding each of the thirteen military districts into which the republic is divided. The principal war arsenal is in Rio de Janeiro. Military instruction is given at the *Eschola Militar* of Rio de Janeiro.

The navy of Brazil consists of fifty-seven vessels. It has a personnel of over 13,000 men. The principal naval arsenal is located at Rio de Janeiro. The naval school is situated on the island of *Enxadas*, in the Bay of Rio de Janeiro.

Education in Brazil is in a backward condition. It has been estimated that 80 per cent. of the population can neither read nor write. Primary instruction is free, but not compulsory, and the schools are supported and supervised by the States. Higher education is under the control of both national and State governments. There are many private schools in all of the large cities, and perhaps the best educational work in Brazil is done in these.

It was the Revolution of 1889 and the constitution which was adopted two years later that brought about the separation of church and government. Before that time, the Roman Catholic Church had been supported by the State; after 1891, the national and State governments were forbidden by the constitution to establish or subsidize religious worship, and its freedom was guaranteed. However, the religion of the majority of the inhabitants of Brazil is Roman Catholic.

Brazilians have a natural taste for art, music and literature. The opera, "*Il Guarani*," of the Brazilian composer Carlos Gomes, who lived from 1839 to 1896, was produced in most of the European capitals. The most prominent Brazilian painter is Pedro Americo; and in sculpture Rodolpho Bernardelli has done excellent work.

The Portuguese language is especially adapted to poetry, and for this reason there has been an unusual production and appreciation of verse in Brazil. This country has also produced dramatists, novelists and historians of note.



THE harbor of Rio de Janeiro (ree'-oh de zhan-air'-oh) is one of the world's great sights. It is entirely surrounded by mountains, and affords admirable shelter at all periods to vessels anchored there. At the entrance to the bay is the Sugar Loaf (Pão de Assucar), a conical rock rising 1,212 feet above the water level. The entrance

to the bay, with the fortress of Santa Cruz on one side and the fort of São João (sahng zho-ahng') on the other, is about one mile wide and free from obstruction. A great number of small and beautiful islands stud the waters of the harbor, and countless bays and deep inlets mark its shores.

The name, Rio de Janeiro, means River of January. This name was given to the spot through a mistake of the Portuguese discoverers, who evidently believed that the harbor was the mouth of a river. On the contrary, it is a landlocked gulf twenty miles long and from five to ten miles wide. The full name of the city is São Sebastião do Rio de Janeiro, but the city is generally known merely as Rio. It is the capital of Brazil, and stands on an alluvial plain formed by the filling in of the western shore of the bay. It has a population of 1,500,000.

The discovery of the Bay of Rio de Janeiro was probably made by João Manoel and Amerigo Vespucci (ves-poot'-chee). Through many years French and Portuguese fought for supremacy there. Finally the Portuguese prevailed.

Rio lies upon the south side of the bay, and runs along the shore for five or six miles. It occupies all the space between the water and the mountains behind, and it is cut up into several sections by sweeping ridges which come down from the mountains and jut out into the water. All these sections are connected by a line of avenues running nearly parallel to the coast, so that the city sometimes narrows to a few hundred yards, sometimes widens out where there is a level space, and sometimes climbs the hill slopes. To other cities of the world, mountains are a background; but in Rio the mountains seem to be part of the city. One of the strangest of these peaks is the Sugar Loaf. This is a cone of bare granite, and in former times it could only be scaled by the boldest climbers. Now, however, an electric basket cable car accommodating twenty persons goes to the top of the rock. Another of these peaks is the Corcovado or Hunchback. This is a sharp rocky promontory, 2,329 feet high. From this, one of the most wonderful panoramas in the world may be obtained.

Some of the streets in Rio have been laid out with great regularity, but many of them seem to have sprung into existence without any plan. Since the beginning of the twentieth century, large sums of money have been spent on new avenues and in widening and straightening the old streets. One of the most beautiful of

the city avenues is the Avenida Beira Mar, which extends four and one-third miles along the shore line, and in the wider parts is filled in with beautiful gardens. The public parks and gardens of the city are numerous, and include the Botanical Garden, with its famous avenue of royal palms, each one hundred feet high and all grown from the seed of one planted one hundred years ago in the days when the King of Portugal held his court in Rio; the Passeio Publico, dating from 1783; the Praça Tiradentes, with its magnificent equestrian statue of Dom Pedro I, executed by the French sculptor Luiz Rochet (loo'-ee roe'-shay) and others.

Rio has no cathedral, but the old imperial chapel is used as one. The foundation was once laid for a great cathedral, but the building stone was taken over for a neighboring theater and the foundations were afterwards used for the Polytechnic School. The old city palace dates from 1743, and was the residence of the royal governors, but is now used by the national telegraph offices. The São Christovão Palace, in the suburb of that name, was the residence of the Emperor Dom Pedro II. It is now occupied by the National Museum. The Cattete Palace, on the street of that name, officially a private residence, is now the official home of the president. It is richly decorated within, and partly surrounded by a handsome park.

The Avenida Rio Branco is claimed by the Brazilians to be the most beautiful street in the world. Every style of architecture is represented there. Many banks and commercial houses may be found there, and also the buildings of the leading newspapers, together with the National Library, Art Museum and the Municipal Theater. The National Library is called the most valuable in South America, and with more than 400,000 catalogued volumes, is the largest south of the equator. It is housed in a handsome building of the best modern equipment.

The Art Museum has in its collection the original works of many of the old masters. A large number of productions of Brazilian artists is also included in the collection, which is said to be the largest and most important in South America. Opposite the Art Museum is the Municipal Theater. This theater, like the Colon Theater in Buenos Aires, is fitted up with every modern improvement. It is modeled after the Paris Opera House, though a trifle smaller, and it is richly decorated. The theater was inaugurated in July, 1909.





SÃO PAULO (sahng pow'-lo) is the briskest and most progressive place in all Brazil. It is also one of the oldest towns in the country, having been founded in 1554 by a Jesuit missionary named Manoel de Nobrega. The settlement at first bore the name of Piratininga. The name São Paulo was transferred to it from the

name of the Jesuit college there by the Governor-General of Brazil, Mem de Sá. Although of greater age than any city of the United States, it made small progress for three centuries. In 1872 it had a population of 26,557, but within the last forty years it has shown amazing growth, and now has about 400,000 inhabitants, thus taking the fourth place among the cities of South America and being second in Brazil only to Rio de Janeiro.

São Paulo is the capital of the Brazilian State of the same name, and is a center of education and industry, and the home of many men of great wealth. It is located in a healthful climate, which has produced men awake to the spirit of progress and eager to develop the astonishing resources of the region. One reason for this is that the early settlers, many of whom intermarried with the native Indians, became parents of an extremely bold and energetic race. The free spirit of these men and women has passed to their descendants, and, living in healthy uplands, they have shown a great deal of industrial and political activity. Since 1875 the planting of enormous tracts of land with coffee has rapidly raised the wealth of the region.

The railway which connects the coffee planting interior and São Paulo with the port of Santos is remarkable. It is one of the great mechanical achievements of the world. It makes an ascent of 6,200 feet in seven miles. Beginning only 15 feet above the sea, five inclined planes with a grade of eight per cent. each, about one and one-quarter miles long, serve for the rapid climb. Four intermediate levels of about 600 feet each separate the planes, and above each plane is a stationary engine to run the cables, and to grip these there is a small special engine attached to each car. Safety is secured by the "locomotive brake," which is attached as a last car to each ascending and descending train; for further safety there is a simultaneous descent and ascent of trains each way; and there are other devices too numerous to describe. The cable is an endless steel wire of enormous strength, run by a 1,000-horse-power engine, and capable of carrying six freight or three passenger cars at a time.

The railway yields the largest dividends of any line in Brazil. Its vast earnings come from the transport of coffee. In addition to the other freight, seven of the ten million bags of coffee annually exported are carried by this railroad. The extraordinary completeness and finish of every part of the railroad, road-bed, rails, stations and other buildings, show how successful the road has been. The divi-

dend allowed to the shareholders is restricted, and the directors spend the surplus in securing not only efficiency and security, but even elegance. The station in São Paulo is one of the finest in the world.

São Paulo is located on the Tieté (tee-ay-tay') River, forty-nine miles by rail northwest of the port of Santos and 308 miles by rail west of Rio de Janeiro. The greater part of the city occupies an elevated, open strip of table land; and a small part of it is in the lowland bordering the Tieté. São Paulo has grown so fast as to show few traces of its antiquity except in the center, where the narrow and crooked streets of the business quarter have a picturesque variety.

The streets are well paved, and lighted with gas and electricity, and have electric railways.

Most of the public and business buildings and residences are of modern Italian and French architecture. Brick is used to come extent, but most of the building material is broken stone and mortar, plastered outside and covered with stucco and ornaments. The private residences of the city are the finest in the republic, for the city is a wealthy one. Some of these homes are surrounded by beautiful gardens and parks.

Some of the noteworthy buildings near the commercial center of the city are the fine Palace of Congress, the handsome Agricultural Building, the Treasury, the Post Office, the Exchange, the Chamber of Commerce and the Public Library. The Cathedral, and the churches of São Paulo and St. Gonzalo (gon-sah'-lo) are among the most important in the city. The handsome theater is an imposing edifice. It was recently erected, at a cost of \$1,000,000, and compares with the best in Europe, and surpasses any in the United States.

The Hotel of Immigrants is an interesting establishment where thousands of families from Europe are welcomed annually and entertained free of charge for a time.

Outside the city of São Paulo is the Ypiranga (ee-pir-an'-ga) or Independence Building, which is at the same time a monument and an institution of learning. It was on the plain of Ypiranga that the Declaration of Brazilian Independence was proclaimed on September 7, 1822. The building is a splendid edifice, erected in 1885. It contains a museum, with treasures of historical and scientific interest and some fine paintings by Brazilian artists. It also has one of the largest fresco paintings in the world, showing Dom Pedro of Braganza, then Regent of Brazil, surrounded by his generals, proclaiming the independence of the nation.



ITS name is really not Bahia (ba-hee'-ah), but São (sahng) Salvador. The beautiful bay with its vast sweep is called Bahia de Todos os Santos, or "The Bay of All Saints." São Salvador is the capital of the State of Bahia in Brazil, and the name of the State, as in the case of one or two other Brazilian cities, has been transferred by

foreigners to that of its capital city. Bahia was once the capital city of Brazil, and in early colonial days stood as a rival to Rio de Janeiro; but those days are no more, although Bahia is Brazil's third largest city, with a population of 285,000, and is a port of great interest and importance. It is very favorably situated, 720 miles from Rio de Janeiro on the shore of a sheltered bay, which is visited by vessels of almost all the lines that serve South America. The port is guarded by a circular fort.

Bahia is famous for its tobacco and for its bananas. It is also the great cocoa port of Brazil, furnishing about one-fifth of the world's supply. The region thereabout produces also coffee, rubber, cotton, sugar, nuts, woods and other products, besides a wealth of diverse minerals. The largest carbonado, or "black diamond," ever discovered was found there in 1895. It weighed 3,150 carats, and was divided in Paris into smaller stones. Even the sand of this region is exported, being worth \$100 per ton.

Bahia was founded in 1549 by Thomé de Souza, the first Portuguese Governor-General in Brazil. It was the center of the Portuguese colonial administration down to 1763. Until 1905 it was the metropolis of the Roman Catholic Church in Brazil.

In 1624 the Dutch captured the city, but they held it for only a few months. Bahia was always conservative in character, and in 1822 it hesitated to adhere to the Brazilian Declaration of Independence, and also to the Declaration of the Republic in 1889.

The appearance of Bahia is striking. The upper town occupies a high, almost perpendicular bluff, while the lower town, looking almost as if it had been pushed over, occupies a narrow strip along the water front. The upper and lower towns are connected by two elevators run by hydraulic pressure, each of which carries fifteen or twenty persons.

None of the buildings of the city have a great deal of architectural merit, but there is a quaint old-fashioned look about the streets and squares, and the houses are interesting because many of them have stood unchanged since the eighteenth century. Many of the familiar features of a Portuguese town are to be found in Bahia—irregular and narrow streets, houses

often high roofed with red tiles and colored with all sorts of washes, pink, green, blue and yellow. Sometimes the whole front or side of a house is covered with blue or yellowish brown tiles, a characteristic of Portuguese cities which has come down from Moorish times.

The lower part of the city is the commercial section of Bahia. There are the markets, the custom house, arsenals, post office, factories, and many of the stores and the principal business houses. The streets are very narrow, although there is one very pretty plaza.

The upper town, which may be reached either by one of the elevators or by climbing a steep and narrow street, has wide thoroughfares, handsome residences, and attractive gardens. Here are also to be found churches, schools, theaters, hospitals, the academies of law and medicine, the governor's palace, the public library and the museum. Among the churches, one of the most interesting is the São Francisco, which was built in 1713, with elaborate and gorgeous interior decorations. The Collegio Church of the Jesuits, now the Cathedral, was built of stone prior to 1572, and has an imposing interior, the details of its ornamentation making it perhaps the most curious in Brazil. The oldest church in Bahia is the Church Nossa Senhora da Ojuda.

Bahia has one of the best medical schools in South America. It has also a law college, a public library with 30,000 volumes, and a municipal library with 20,000 volumes. Its theater is called the São João Theater. The largest and most popular garden in the city, called the Passeio Público, contains an obelisk of Egyptian marble, commemorating, it is said, the arrival of King John VI in Brazil. Another explanation is that it commemorates the opening of Brazilian ports to foreign commerce in 1808. The Largo Duque de Caxias (caxias) contains, in a pretty garden, an imposing monument of Carrara marble and bronze, 100 feet high, which is called the Dois de Julho, commemorating the date of the evacuation of the State of Bahia by Portuguese troops in 1824, sealing its independence. At the top of the tall Corinthian column stands an Indian with his foot on a dragon, signifying the triumph over despotism. Colossal figures of bronze represent the great rivers of Brazil. This is one of the finest monuments in the country.



ONE traveler has said that the Brazilians make the best cups of coffee in the world. This is as it should be, because Brazil is the most important coffee producing country in the world. Two-thirds and possibly three-fourths of all the coffee used in the world is produced by Brazil.

In its early history coffee was held by some to be an intoxicating beverage, and severe penalties were threatened to those using it. Nevertheless, the coffee drinking habit spread rapidly.

It was toward the end of the sixteenth century that coffee came into general use in the near East. It was also introduced about this time into Europe, and became very popular during the seventeenth century. Coffee houses were opened all over the Continent. In London the first one was established in 1652. These coffee houses soon became popular, and they played an important part in the social life of the seventeenth and eighteenth centuries. There was always great opposition to the coffee houses, because they were believed to be places of sedition and disloyalty to the Crown. In England, Charles II tried to suppress them; but in spite of everything the use of coffee grew.

Up to the end of the seventeenth century all the coffee came from Yemen in south Arabia, where the true famous Mocha (moe'-ka) is still produced. About this time plants were introduced from Arabia to Java. Then the Portuguese introduced coffee into Ceylon. Within a few years coffee reached the West Indies. It was about the middle of the eighteenth century that its cultivation was introduced into Brazil. It is said that in 1761 a deserter came into that country and brought with him a few seeds. Its cultivation was on a very small scale for many years, however. Gradually a number of States were found whose soil was adapted to it. In 1817 the first shipment of coffee to amount to anything was made from Brazil—about 6,000 bags. The State of São Paulo from the very beginning took the lead in the production of coffee. Its soil seemed especially adapted to the cultivation of the coffee plant. Now this State furnishes one-fourth of the world's coffee supply, and it is estimated that there are nearly seven hundred millions of trees there. The annual production averages about 10,000,000 sacks, or 1,320,000,000 pounds of the berry.

Coffee plants are grown from seeds, and the plants require certain conditions of soil and climate. Hilly lands with an eastern exposure are generally chosen. Coffee trees are a matter of slow growth, requiring at least four years to mature after the young plants are set out. They are always transplanted during the rainy season, when about eighteen months old,

at which time the young plants are about a foot high.

The fruit grows in clusters of from six to a dozen berries. When ripe, the berry resembles a red cranberry, and the transition from the white blossom converts the field from the snowy effect of the flower to the crimson of the berry.

The coffee trees begin to blossom in September. It requires a number of months for the berries to mature. The first picking does not take place in the State of São Paulo until the last of May or the first of June. From that time on, the plantations are scenes of activity for five or six months. Thousands of pickers flock to the coffee region from all over the country. On an average, each tree produces about three pounds of coffee. After being picked, the coffee must be washed, pulped, dried and then submitted to several stages of preparation. After the coffee is washed and soaked, the pulp is removed by a revolving cylinder, set with teeth; after which the beans, which are in the center, are run into tanks to wash away all traces of the pulp. The berries then are spread out in thin layers to dry. Men with wooden rakes are kept busy turning over the berries so that they are evenly dried. When this has finally been accomplished a parchment skin covering the berry is removed by passing the beans through heavy rollers. They are then passed through machines which husk, fan, polish and sort them according to sizes. The various grades are now placed in coarse sacks and shipped to the great coffee commission houses.

Let a world-famous traveler tell how coffee is prepared and served in Brazil: "The roasting process is very thorough, for it is roasted until the average American housewife would call it burned. The black roasted coffee is reduced to a fine powder, and then placed in a woolen bag, through which hot water is poured. It is never allowed to boil, so that their coffee is rather a percolation than an extraction. I am not a cook, but I do know that the coffee as prepared by the Brazilians is delicious and seems to be free from the harmful effects. In the morning it is served in about equal proportions with hot milk, but at all other times clear. Little dainty cups of black coffee served with plenty of damp sugar are always served at social calls, at nearly all public offices, and in many other places where one visits."